The work is professedly based upon Rankine's treatise, and is supplemented by a large amount of other, and some new, matter. The plan of the work is in some respects unusual. Its first part is devoted to the statics of structures, the second to the kinematics of machines, the third to the dynamics of machines, the fourth to the strength and stiffness of materials, and the fifth to the transmission and conversion of energy by machines.

In part i. but little will be found to demand special notice. The methods of graphical statics are adopted throughout, and are applied in succession to the simplest and the more complex cases. The straining action of a load applied to a structure is considered in several chapters; shearing, bending, and twisting being taken up in order. Cases of frames having redundant parts, and the action of a travelling load, are given with propriety considerable space. In part ii. we find the author following Rankine in an innovation upon the standard plan of text-books on mechanics as hitherto constructed. Professor Cotterill here introduces the study of the kinematics of machines, — a subject not often considered to form a part of this general division of the theory of engineering, and only treated of, up to the present time, to any considerable extent, in separate works, as in Willis's and in Reuleaux's well-known works. Rankine introduced this subject, under the title 'Geometry of mechanism,' into his 'Machinery and mill-work,' and introduced it also in his 'Applied mechanics.' This author has introduced to a limited extent the nomenclature and methods of the latest of the great masters of this division of the science of engineering, Professor Reuleaux, and has thus brought the matter fully up to the time. A feature of the work to be noticed here, perhaps even more than elsewhere, is the selection of mechanism familiar to the engineer, and where possible of those in common use, in illustration of the principles to be explained. Part iii., on the dynamics of machinery, as would naturally be expected, occupies a large amount of space. It opens with a statement of the 'principle of work,' shows how resistances are determined in common cases, defines energy, illustrates the methods of its transfer in machines, and considers the kinetic form of energy as met with in freely-moving bodies and in machines. A chapter is devoted to the dynamics of the steam-engine, and especially to the graphical representation of the variation of effort and of energy at the crank. All of this work is interesting and valuable; and the greater part of it is here for the first time, so far as the writer is aware, introduced into the literature of the schools.

The study of cases of incomplete constraint and of straining actions in machines gives the author an opportunity to introduce the principle of momentum and other dynamical principles, and to illustrate their application by the analysis of the governors and other familiar cases. Part iv., on the strength of materials, occupies more space than any other division of the book. Impact, compound stresses, and flow are as fully treated as the limits of the book permit, and more so than is usual in treatises of this character. The work of Professor James Thomson on the flow of solids is described, and the experiments of Tresca and of Wohler are cited.

The volume includes in its last division, part v., a discussion of the principles involved in the transmission of energy by fluids, and of its transformation. The flow of fluids, the action of machines driven by them, and the elementary principles of thermodynamics, are here studied.

An excellent feature of the book is its references to works in which the subjects treated are more fully developed by accepted authorities. Examples are introduced at the end of each chapter which are doubly interesting as illustrating the special case there treated, and as exhibiting applications occurring in the engineer's practice. The engravings are numerous, and, in all cases in which it is possible, drawn from working machines and structures common in engineering.

The work as a whole is one which will not only increase the reputation of its author, but will earn for him the thanks of many instructors in technical schools who have long been hoping for such a treatise as will permit them to discard works, which, valuable in their day, are now left behind in the forward movement of the profession of engineering and of science.

SCIENTIFIC BUTTER-MAKING.

A manual for scientific butter-making. By W. H. LYNCH. Printed by order of the legislative assembly. Toronto, *Robinson pr.*, 1883. 15+ 204 p. 8°.

THE author, in the introduction to this manual, expresses himself in sympathy with the views advanced by Arnold and Bell on previous occasions, that all persons connected with the prosecution of the dairy business should strive to make themselves familiar with the principles on which success depends. These

considerations are, in his opinion, the key to the character of the manual.

Practice and theory are treated in separate chapters, beginning, for stated reasons, with a description of the most successful method of butter-making, and closing with an exposition of the philosophy of the various modes of operation. The discussion opens quite deservedly by dwelling on the importance of cleanliness as the first and indispensable requirement for success in the dairy industry. The first chapter treats of the best indorsed rules for milking, and for setting milk for cream. The setting of milk in open and closed vessels, as well as the proper conditions of the cream for churning, and the management of churning, are carefully discussed. The author very frequently cites well-known authorities in the dairy business — Professors Arnold and Lewis — in support of his statements. A detailed description of the best rules for collecting, washing, pressing, salting, packing, and marketing the butter, closes the first chapter on the scientific method or process.

The succeeding chapter explains the philosophy of the rules of treatment during the various stages of the process, which have been previously enumerated and critically discussed. The different points involved are here stated in an equally instructive manner. More prominence might have been given to a consideration of the chemical character of the various glycerides constituting the fat of milk, and consequently of the butter, as compared with those which constitute other animal fats. The serious influence of exceptionally large quantities of the glycerides of four volatile fatty acids on the successful manufacture and on the keeping of butter is quite manifest, and deserves more than a passing notice. The first part of the book closes with remarks on milk-production, on the natural functions of the cow, on breeding and feeding, on dairy utensils and supplies, on water and its uses in the dairy, and on salt and its proper application in butter-making. The discourse on these subjects occupies about forty pages of the manual.

It is unfortunate that by far the larger part of the pamphlet (the appendix) should be taken up with quotations from agricultural newspapers, and that in the closing paragraphs it should be stated that Mr. Lynch is the owner of the patents on the forms of butter-making appliances which he advocates. The work, with its numerous newspaper extracts and poor printing, has not the appetizing appearance so essential to a new book, and is calculated to repel one at the first glance.

MAN'S FUTURE.

The destiny of man, viewed in the light of his origin. By JOHN FISKE. Boston, *Houghton, Mifflin, & Co*, 1884. 10+121 p 16°.

"THE question of a future life is generally regarded as lying outside the range of scientific discussion," says the writer; but yet he thinks it is one upon which an opinion may be legitimately entertained, and he proceeds to say, that opinion "must necessarily be affected by the total mass of our opinions on the questions which [do] lie within the scope of scientific inquiry." His essay is to let us know what the teachings of the doctrine of evolution as to the origin of man seem to indicate as to his final destiny. His conclusion is, that "the more thoroughly we comprehend that process of evolution by which things have come to be what they are, the more we are likely to feel that to deny the everlasting persistence of the spiritual element in man is to rob the whole process of its meaning," and that it goes far toward putting us to 'permanent intellectual confusion;' which, as a well-known authority assures us, is a scientific *reductio ad absurdum*. So, finding "no sufficient reason for our accepting so dire an alternative," our author declares, "For my own part, therefore, I believe in the immortality of the soul, not in the sense in which I accept the demonstrable truths of science, but as a supreme act of faith in the reasonableness of God's work. . . . The belief can be most quickly defined by its negation, as the refusal to believe that this world is all." We must refer to the little book itself for the line of argument which leads up to this *credo*. And if the argument, however scientifically based, is philosophical and even theological in form, it needs only to be understood that this essay is, in fact, an address to the Concord school of philosophy last summer, at the time when the subject of immortality was under discussion.

NOTES AND NEWS.

THE following is the full list of papers read at the Newport meeting of the National academy of sciences, Oct. 14–17: On the Columella auris of the Pelycosauria, E. D. Cope; The brain of Asellus, and the eyeless form of Cecidotaea, A. S. Packard; On the theory of atomic volumes, Wolcott Gibbs; On the complex inorganic acids, Wolcott Gibbs; Notice of Muybridge's experiments on the motions of animals by instantaneous photography, Fairman Rogers; Notice of Grant's difference-engine, Fairman Rogers; On the thinolite of Lake Lahontan, E. S. Dana; On the mesozoic coals of the north-west, R. Pumpelly;